

# Sampling macroinvertebrates

## Objectives:

Investigate how macroinvertebrates adapt to their environment.

Draw conclusions about water chemistry, the food web, and aquatic ecosystem functions from the analysis of macroinvertebrates.

Students required: 3-5

Time required: 1-2 hours

**UNDERSTAND SAFETY PROTOCOLS.** Before entering the water, make sure that your team understands how to: use life vests, walk carefully in moving water with slippery rocks and work together to prevent injury. In fast-moving rivers, there should always be a person in the water downstream with a throw rope.

## Procedures for Sampling in fast waters

(1) **Choose a sample area.** Designate a 50 foot section of the stream to sample from.

(2) **Organize and become familiar with equipment.** Designate holding containers (white tubs) according to where you will be sampling from: riffles, pools, and glides (This will allow you compare and contrast macros from different areas of the stream). Place 3-4 inches of stream water in the containers. Practice collection techniques on the stream bank (refer to (3)).



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## Materials Needed:

pencil  
data sheets  
two large nets  
two 1-gallon white tubs  
white ice cube trays  
waders  
waterproof gloves  
turkey baster  
tweezers  
magnifying boxes  
field guides  
life vests  
small nets  
calculators  
rulers  
throw rope



## PROCEDURES CONTINUED-->

(3) **Collect your sample.** Place the net on the stream bottom, with the opening of the net facing upstream. The handle should be sticking straight up from the water. Make sure you take note of the stream area type (riffle, pool or glide) that you are sampling from. Collect from an area the width of your net by 3 foot area upstream of your net. There are two methods of collection:

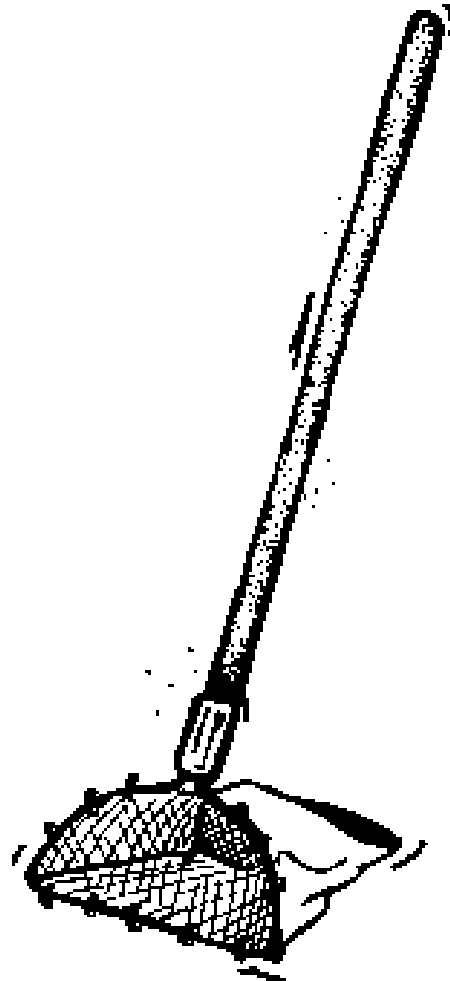
(A) Pick up the rocks, one by one. Hold each rock upstream of the net opening, and rub the surface to dislodge the small insects that are clinging to the rock's surfaces. Place the "clean" rocks outside the sample area; OR

(B) Do the "macro shuffle."  
Upstream of the net opening, move the rocks and substrate around with your boot, thus dislodging the insects.

Remove the net from the water with a forward scooping motion, so you don't lose your sample.

Macros can also be found amongst aquatic plants and leaf packs. Use the net to sweep through the leaf debris and through the stands of aquatic plants. In addition, inspect logs, stumps or large boulders for macros. Simply pick the insects off by hand.

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net

## PROCEDURES CONTINUED-->

(5) **Place samples in holding containers.** After sampling, turn your net inside out and rinse all macros into a the appropriate white tub (riffle, pool or glide). If there are large pieces of organic debris (leaves, sticks, etc.), "wash" them free of insects, and then remove them from the tub.

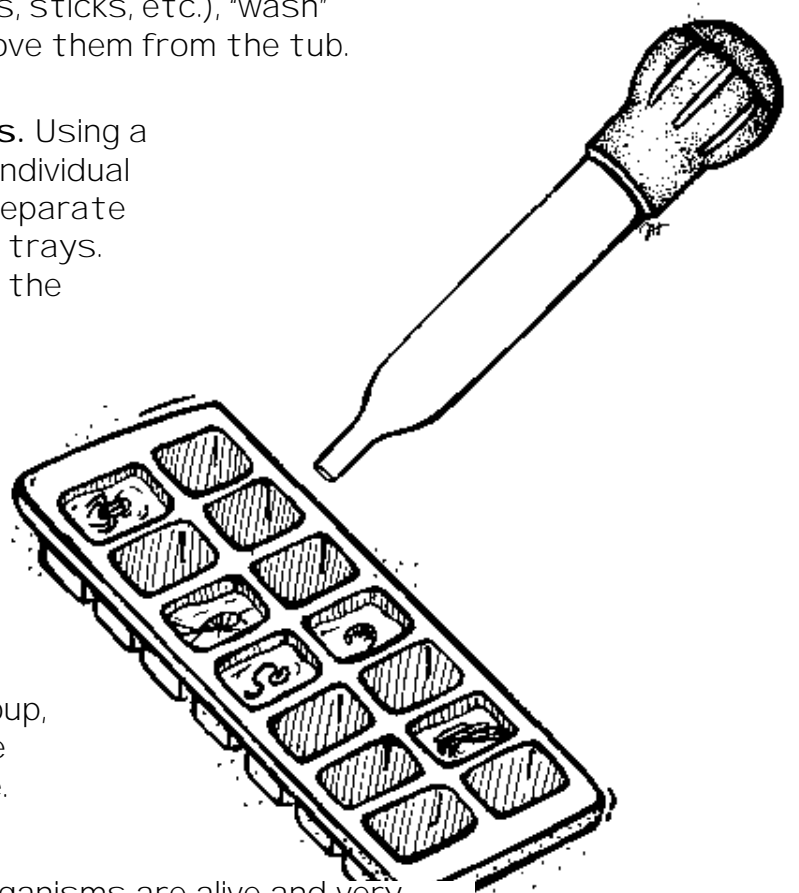
(6) **Sort your macroinvertebrates.** Using a turkey baster or eye dropper, suck individual specimens up and place them into separate cube compartments of the ice cube trays. Place similar-looking specimens into the same compartment to count them.

(7) **Examine and characterize your specimens.** On a data sheet, sketch to scale and record key features for each of the most common macros.

(8) **Identify the specimens.** Using field guides, record feeding group, pollution sensitivity and name of the most common macros in the sample.

(9) **Gently set them free.** These organisms are alive and very important in the aquatic system. Gently return them to the area that they were collected.

(10) **Make sense of your data.** Use the "Calculation Sheet" to help you make sense of your data.



## Procedures For Sampling in Slow or Still Water Systems (Wetlands)

(1) **Choose a sample area.** Macroinvertebrates can be free swimming, crawling, attached to vegetation or along the bottom of the pond or wetland. Choose a site and record sample site information on the datasheet.



(2) **Collect macroinvertebrates.** Gently, sweep net through your sample area (Be careful not to uproot or crush the vegetation). Pay attention and note where the specimens were collected from (vegetation, silt, rocks, etc.).



(3) **Place samples in holding containers.** When you have completed sampling in one area, turn the net inside out and rinse all invertebrates into white tubs.

(4) **Sort the macroinvertebrates.** Using a turkey baster or eye dropper, suck individual specimens up and dispel them into separate cube compartments of the ice cube trays. Place similar-looking specimens into the same compartment to count them.

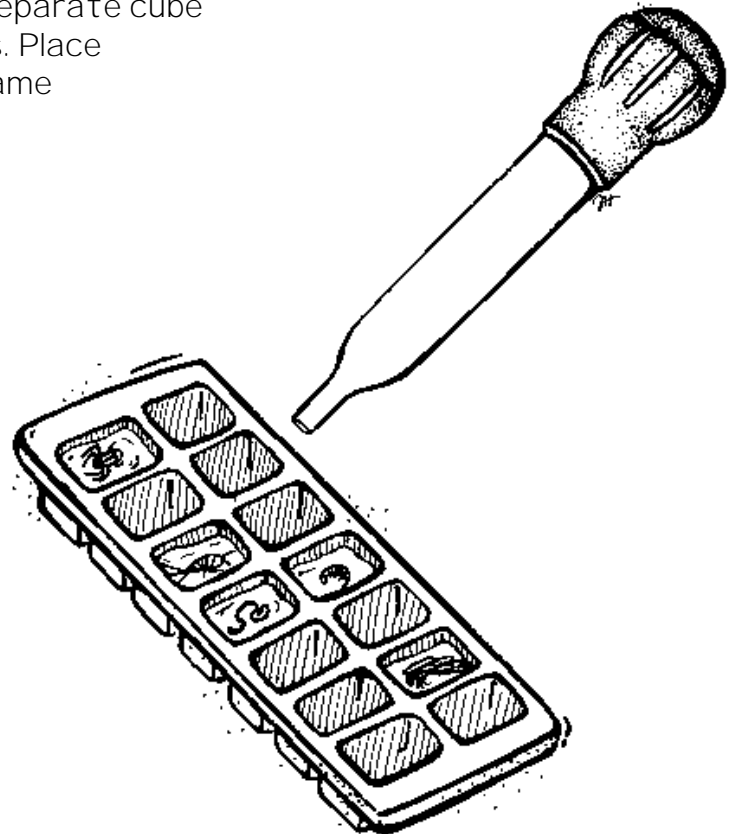
(5) **Examine and characterize your specimens.** On a data sheet, sketch to scale and record key features for each of the most common macros.

(6) **Identify the specimens.**

Using field guides, record feeding group, pollution sensitivity and name of the most common macros in the sample.

(7) **Gently set them free.** These organisms are alive and very important in the aquatic system. Gently return them to the area that they were collected.

(8) **Repeat the process in a different sampling area.**



## Inquiring Minds Want to Know:

How are the different macroinvertebrates you sampled connected to other organisms in the aquatic ecosystem?

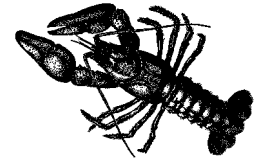
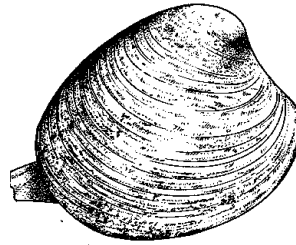
How do the different body parts of macroinvertebrates--their shape (skinny and flat, or round and large), presence or absence of wings, mouthparts, special appendages and outside covering--relate to what they eat, where they were found, and how they live?

How does stream velocity affect the kinds of invertebrates species that live in different parts of the aquatic system? The presence or absence of overhanging vegetation? Dissolved oxygen?

What does your macroinvertebrate diversity tell you about the types of food (energy) available in different parts of the system?

What did the pollution sensitivity of the macroinvertebrates tell you about your system?

How will your sample of macroinvertebrates compare with those collected in other habitats?



## great resources on macros

### Field Guides

**Guide to Pacific NW Aquatic Invertebrates** by Rick Hafele & Steve Hinton. Published by Oregon Trout (503-222-9091).

### Websites

[www.eosc.osshe.edu/~twelch/aquaticinsects/aquinsect.htm](http://www.eosc.osshe.edu/~twelch/aquaticinsects/aquinsect.htm)

[www.osf1.gmu.edu/~avia/stonefly.htm](http://www.osf1.gmu.edu/~avia/stonefly.htm)

## TIPS FOR TEACHING macros

Have students each choose a macro to identify, then have them teach the rest of the group about their insect.

Have students describe macros in their own words before using the field guides.

Use macros to talk about adaptations and diversity

